GAS ABSTRACTS

A MONTHLY REVIEW OF CURRENT LITERATURE RELATING TO THE GAS INDUSTRY

PREPARED BY THE TECHNICAL AND LIBRARY STAFF OF THE

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GAS ABSTRACTS

GAS ABSTRACTS represents the inauguration of a new phase of service to the Gas Industry by the Institute of Gas Technology, the dissemination of information. GAS ABSTRACTS, which is published monthly, consists of abstracts of papers appearing in current technical journals in the field of gas technology and related subjects.

Scope of Selection: All articles, papers or books, both theoretical and applied, pertaining to the manufacture, distribution or utilization of natural and manufactured gas will be considered. Those periodicals which are received by the library (listed on the last two pages) will be read regularly. For the time being, only abstracts of these articles which are of immediate interest to our own staff, with a reasonable consideration of the interests of research and development men in the industry as a whole, will be included.

Method of Abstracting: For the most part, the abstracting is done by the research staff of the Institute of Gas Technology. It is intended, in general, that the abstracts supply the technical man with sufficient information about the data contained in the paper to enable him to determine the desirability of reading the entire paper. For some articles which seem of unusual value a more detailed summary will be made.

Format: The publication is prepared in such a manner that the abstracts can be cut and pasted on 5x8 cards for filing. We have considered publishing the abstracts in card form but for the present are unable to do so because of the added time and expense involved.

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I. THE GAS INDUSTRY

ENGINEERS, CHEMICAL

WEISS, J.M. A CASE FOR STATE LICENSING OF CHEMICAL ENGINEERS. *Chemical Industries* 56, 601, 1945 *(April)*

Unless a sharp line of distinction can be drawn between the true professional man and the technician, the rising tide of unionism may engulf professional groups as well as sub-professionals. In the case of chemical engineers, Mr. Weiss believes that the state licensing laws provide a means for such distinction. (Condensation of a communication to the council of the American Institute of Chemical Engineers.)

--Author's abstract

GAS INDUSTRY

RANDALL, L.F. INDUSTRIAL GAS: FUTURE PROSPECTS AND COMPETITION. *Gas Times* 43, 6-9, *1945 (April 21).*

A survey of the pre-war status in industry shows that about 2 per cent of the heat was supplied by gas. The future expansion of the industry will depend upon the price of gas and upon the efficiency of the industrial sales organization. With the development of new industries and modernization of the old, there will be many new fields open to the industry, which are discussed.

GAS INDUSTRY - ECONOMICS

HENRY, D.A. IS THE HORSE BEING STOLEN? *Gas Age* 95, 38-39, 90-94, *1945 (May 3)*

Some pipelines which sell all of the gas they transport to independent distributing companies for resale may not be able to meet all fixed charges if the sale of gas on an interruptible basis at low price for industrial use is prohibited, because the difference between the revenue obtained from such interruptible load and the incremental cost of serving it is an important part of such fixed charges. Thus in some cases action taken in an effort to protect the supply of natural gas for the future domestic consumer could result in endangering the supply to the present domestic consumer by threatening the financial stability of the pipeline company if the resale rates were not changed, or of the distributing company if they were.

B. Miller

POE, E.H. WHY SHOULD THE COAL INDUSTRY CONTROL NATURAL GAS EXPANSION? *Gas Age* 95, 44-47, *1945 (May 3).*

Coal industry and railroad representatives have appeared before the Federal Power Commission to oppose the granting of certificates for construction of new facilities for natural gas transportation. While no certificates have so far been refused by the FPC on the grounds urged by these competitive interests, the FPC has considered such grounds and has conditioned some of the certificates. The objections of the coal and railroad interests before the FPC are continuing, and the natural gas industry will have to overcome these objections if it wishes to expand.

--B. Miller

I. THE GAS INDUSTRY

HEATING, HOUSE

WEISER, J.A. PRODUCTION COST OF EXCESS GAS MADE FOR HOUSE HEATING ABOVE PRESENT SATURATION. *Am. Gas J.* 162, 25-26, 29-30, 1945 (May).

This study of the Newport Gas Light Company, by its President and General Manager, shows that a small plant cannot afford to produce gas for house heating by means of standard water gas sets for 2, 5 or 10 per cent saturation. The investment required for 5 per cent saturation would be the same as for 2 per cent saturation while the investment required for 10 per cent saturation would be only 37 per cent greater than the investment required for 5 per cent saturation. If more than 10 per cent of the domestic customers became house-heating customers, an entirely new production plant would be necessary.

--B. Miller

HEATING, RADIANT

CALCULATIONS FOR RADIANT HEATING AN INDUSTRIAL BUILDING. *Heating and Ventilating* 42, 64-66, 1945 (May).

Floor plans for heating coil layout, photographs of heating coils in position and a few calculations illustrate briefly the essence of radiant heating as applied to the plant of Thompson Products, Inc., Detroit, Michigan.

--H.T. Inatomi

MANAGEMENT

WENDELN, O.B. MANAGEMENT FROM THE SUPERINTENDENT'S VIEWPOINT. *Petroleum Refiner* 24, 165-169 (May); 120-124, 1945 (June)

In this article a plant superintendent sets forth the viewpoint from which the plant manager must weigh and consider the problems that are common to keeping cost of manufacture within proper bounds. It gets down to frequent estimation of functions of routine duties. Frequently the question must be asked "is it still necessary?" Otherwise routine duties will persist long after serving their purpose.

—Excerpt from author's abstract

PATENTS

TOULMIN, H.A., JR. PROTECTING RESEARCH PROFITS. *Chemical Industries* 56, 581-3, 1945 (April)

American industry has thrived under the encouragement of the patent system. The complexity of modern inventions has inevitably been reflected in the complexity of patent procedure, and the system is often attacked by those who are unfamiliar with its intricate workings. Here the author, a well known patent lawyer, makes more understandable those policies which have lent much to the prosperity and stability of our industrial structure.

PATENT SYSTEM

DEARBORN, R.J. INDUSTRY'S POSITION ON PROPOSED PATENT REFORMS. *Oil Weekly* 118, 43-46, 1945 (June 4).

A plea for the continuation of the patent system and a discussion of proposed revisions. Mr. Dearborn is president of Texaco Development Corporation and chairman of National Association of Manufacturers' Committee on Patents.

I. THE GAS INDUSTRY

RESEARCH

Murphy, W.J. WITHOUT BENEFIT OF ROSE-COLORED GLASSES; REVIEWING SOME PROBLEMS OF THE CHEMICAL INDUSTRY. *Chem. Eng. News* 23, 885-889, 1945 (May 25).

Discusses the current problems of research and development, emphasizing the necessity of selling an understanding of research, the "regimentation of research" and the effect of attacks on the patent system.

RESEARCH - A.G.A. PLAN

West, J.W., Jr. DEVELOPMENT PLAN GAINS MOMENTUM. *Am. Gas Assoc. Monthly* 27, 247-252, 1945 (June).

A report on the details of the organization of the A.G.A.'s new research and promotional plan, with charts showing the scope and activities of the various committees.

--G.D. Creelman

RESEARCH, INDUSTRIAL

Flett, L.H. TECHNICAL SERVICE; LINK BETWEEN RESEARCH AND SALES. *Chemical Industries* 56, 594-595, 1945 (April).

In recent years a greatly increased emphasis has been placed on the use of technically trained employees to expand the use of chemicals. Technical divisions to assist in marketing have been established under a variety of names by most of the large companies in the chemical industry. The term "Technical Service" has been commonly used to designate such groups.

--Excerpt from article

Dietz, W. SMALL CHEMICAL COMPANIES CAN AFFORD A RESEARCH PROGRAM. *Chemical Industries* 56, 784-785, 1945 (May).

The well-established benefits of research need not be enjoyed only by large companies. Small and medium-sized concerns can also afford a practical research program which will bolster their competitive position by the development and improvement of marketable products.

--Publisher's abstract

Shepard, N.A. HOW CAN WE BUILD BETTER TEAMWORK WITHIN OUR RESEARCH ORGANIZATIONS? *Chem. Eng. News* 23, 804-807, 1945 (May 10).

Research is not a routine job and should be free from the pettiness of red tape and time clocks. To have teamwork in the laboratory the younger members should have the opportunity of coming in contact with research and other executives of their company. They should also be encouraged in professional development through graduate work, published works, and attendance at professional meetings and conventions. As a link between top management and the investigator, the director of research should represent and go to bat for the technical men in the councils of management. Management in turn should not blow hot and cold on research, but should gain the confidence of researchers through consistant backing and clear-cut channels of responsibility.

—Author's abstract.

I. THE GAS INDUSTRY

UTILITIES

Bauer, J. MORE PRECISION NEEDED IN UTILITY REGULATION. *Public Utilities Fortnightly* 35, 604-617, 1945 (May 10).

The author, who is director of the American Public Utilities Bureau, starts with the assumption that the general corporate theory, which is that the common stockholders control the management and for the purpose of profits exert continuous pressure for efficiency and economy, has no application to utility companies. The basic regulatory trouble in dealing with utilities has been the failure to act on the distinctions between natural monopoly corporations and ordinary private business. Regulation cannot be made acceptable from public standpoint with management subjected to the common stock control. The prevalent relation between common stock and management must be superseded by something better. Common stock should be converted to preferred stock and real control of management must pass to the regulatory body. Such a transformation would make the public utility corporation a de facto public corporation whose duty would be to serve the public as economically as possible under continuous and positive control of the regulatory body. This would make possible the fixing of rates so that the total revenues would equal the total cost of service and no more. The cost of service would include operating expenses, depreciation, taxes, proper reserve accruals and the cost of the money prudently invested in the property, including interest on bonds, dividends on present preferred stock, and dividends of a definite amount on the common stock which would in effect thus become a preferred stock. The reserves would include one for casualties and contingencies not included under depreciation and a "rate equalization reserve" which would be credited for any year with the net earnings in excess of the total cost of service and charged or debited with any deficiency. This reserve would furnish full assurance that the dividends on common stock would be paid definitely and, at the same time, equalize the annual costs to be paid by consumers. Because of the definiteness and certainty of payment the rates of return paid for capital invested in such privately-owned by publicly-controlled utility corporations would be brought down close to the interest rates that would have to be paid under public ownership. Overhead and operating expenses would also be close to those for public operation. The costs to consumers might be brought down substantially to those incurred under outright public ownership.

--B. Miller

2. APPLIANCES

BURNERS

Palmer, W.J. BUNSEN BURNERS RESISTANT TO FLASHING BACK. *Gas Times* 43, 32, *1945 (June 9).*

It is claimed that by carefully proportioning and spacing the various burner elements, burners may be rendered immune to flashback at all orifice pressures above 0.9 w.g. Gravity and heat content of the gases used were not mentioned, but since the experience is reported from Australia it may be assumed that coke oven gas was used. The critical ratios required to prevent flashback are as follows: nipple orifice depth to nipple orifice diameter - 0.62-0.65; throat area to port area - 0.165-0.175; nipple orifice diameter to throat diameter - 0.320-0.325.

--M.F. Knoy

Segeler, C.G. NEW TYPE ENGLISH TOP BURNERS. *Am. Gas Assoc. Monthly* 27, *206-207, 1945 (May).*

A non-aerated burner of a type accepted to considerable extent in England for use on cooking ranges is available for testing now for the first time in the United States. It is being tested by A.G.A. Laboratories and, because of its sensitivity to different kinds of gas, results are interesting.

—S. Dean

IGNITION

Bennett, J.G. and Wunder, N.W. SINGLE POINT IGNITION: A STEP FORWARD IN THE "CP" RANGE PROGRAM. *Gas Age* 95, *24-25, 1945 (May 17).*

A fully automatic cooking range is necessary for the progress of the gas industry. On the basis of data on single point ignition, published by A.G.A. Testing Laboratories, the Philadelphia Gas Works Company has made developments in two methods of oven and broiler burner ignition from the top burner pilot - a two-bend and a one-bend flash tube system. A few ranges equipped with each kind of system have been placed in the field.

—S. Dean

OIL AND GAS ENGINES

DIESEL AND GAS ENGINES FOR TRACTORS. *Gas and Oil Power* 40, *167-169, 1945 (May)*

Technical particulars of a German design covering almost identical engines using liquid and wood fuels.

--Author's abstract

REFRIGERATORS

Roebuck, J.R. A NOVEL FORM OF REFRIGERATOR. *J. Applied Phys.* 16, *285-295, 1945 (May).*

According to the plan suggested here, refrigeration is achieved by successive compressions and expansions of a gas in a radial type compressor-expander. In a rotary compressor running at very high speed the gas is compressed on the way from the axis to the periphery, being simultaneously cooled by a fluid carried in separate tubing. On the way back to the axis from the periphery the gas is cooled by adiabatic expansion to a degree commensurate with the ratio of expansion. At the axis the gas will be cold enough to perform refrigeration on a third fluid circulated through this part of the mechanism. Thermodynamic calculations are set forth demonstrating the feasibility of the scheme for which exceptionally high theoretical efficiency is claimed.

--M.F. Knoy

3. COAL AND GASIFICATION

COAL - CARBONIZATION

Hateley, R.N. THE EFFICIENT MAINTENANCE OF VERTICAL RETORTS. *Gas Times* 43, 26-28, 1945 (April 28).

This paper describes the maintenance programme carried out on the vertical retort installation at Walsall. The observations, however, can be applied to any similar setting. (Abridged from a paper to the Midland Junior Gas Association).

--Publisher's abstract

PRODUCTION OF COKE AND BY-PRODUCTS FROM COAL GAS RETORTS IN 1944. *Gas Age* 95, 24-25, 1945 (May 31).

The article is made up of Bureau of Mines statistics.

COAL - GASIFICATION

Cipolon, F. "SYNTHETIC" NATURAL GAS FROM COAL. *Am. Gas J.* 87, 60, 1945 (May).

Foreseeing a shortage of natural gas in the not too distant future, the University of Michigan is investigating methods for the large scale production of synthetic gas of similar composition from coal. This work is sponsored by the Michigan Gas Association. The synthetic methane is to be made from finely crushed coal from which blue water gas is produced first with air and steam. In the second step of the process, the blue gas is converted to methane by using high pressure and a catalyst of nickel or metallic oxide. A heavy oil may be the by-product of the process.

--J.J.S. Sebastian

Fieldner, A.C., Fisher, P.L., and Brewer, R.E. ANNUAL REPORT OF RESEARCH AND TECHNOLOGIC WORK ON COAL. *Bureau Mines Information Circular 7322, 1945 (May).*

Included in this report are summaries of work done on the utilization of coal, carbonization and gasification, and liquefaction. Development work on the Fischer-Tropsch process, synthesis of liquid fuels by hydrogenation of carbon monoxide, and catalysts for primary liquefaction of coal by hydrogenation are some of the topics discussed.

King, J.G. THE BETTER UTILIZATION OF COAL FOR THE PRODUCTION OF OIL AND PETROL. *Gas and Oil Power* 40, 99-101, 1945 (March).

A brief review is given of the modern methods used for the conversion of coals, both directly and indirectly, into motor fuels, oils and other chemical products. The demand for fluid forms of heat (gas and electricity) and for smokeless fuels (coke, low-temperature coke) is expected to increase considerably after the war. The by-products of coal carbonization may not be tar and benzol as we know them today. The distillates of crude tar, creosote, etc., have many uses in chemical industry, but processes of secondary treatment such as hydrogenation may absorb all the crude products not required for the chemical industry and market only refined oils and finished chemicals. The conversion of coal to oil involves the addition of hydrogen in order to decrease the C/H ratio of about 15/1 in coal to about 8/1, characterizing petroleum oil. This process, known as hydrogenation, yields about 72 per cent by weight of the coal treated and

involves two main stages of liquid and vapor-phase treatments. The finely pulverized coal is pasted with heavy-oil and catalyst and is maintained for two hours in the liquid phase converter in an atmosphere of hydrogen at 250 atm. pressure and at around 825°F. From the distillation products of the oil-yield the light-oil is further refined. The middle-oil is subjected to a second stage hydrogenation in the vapor phase by being passed through a static bed of catalyst at about the same temperature and pressure as those used in the first stage. The heavy-oil from the first stage is used again for pasting. The indirect production of oil from coal usually involves the complete gasification of coal or coke and the conversion of the gas to oils. In the Fischer-Tropsch Process the purified gases are passed through nickel and cobalt oxide catalyst at atmospheric pressure and at about 400°F. Lubricating oils of high quality may be made from the primary product by the thermal cracking of the middle-oil and polymerization of the olefinic products with aluminum chloride catalyst. Yields of the order of 35 per cent by weight have been claimed, although these may be considerably higher if Fischer's claims are justified for the direct production of unsaturated oils by the use of an iron catalyst at 15-20 atm. pressure.

—J.J.S.Sebastian

COAL - HYDROGENATION

THE HYDROGENATION OF COAL; A DISCUSSION OF AMERICAN RESEARCHES. *Petroleum* 8, 98, *1945 (May)*.

COAL GAS - PURIFICATION

Thompson, R.J.S. MODERN METHODS OF PURIFYING COAL GAS TO TOWN GAS STANDARD. *Gas World* 122, *41-46, Coking Section, 1945 (March 3)*.

The article presents a detailed review of existing and potential methods for the purification of gas to town gas standards. In general, coal gas having an average hydrogen sulfide content of 500 grains per 100 cu. ft. is considered and must be purified before distribution by reduction of hydrogen sulfide concentration to less than 0.1 grain per 100 cu. ft. Box purification employing iron oxide or lime efficiently meets this requirement but other sulfur compounds present are not removed. The fact that box purification may permit high total sulfur concentration even though hydrogen sulfide is effectively removed has led to other methods of gas purification. Liquid washing systems present many problems: absorption selectivity, regeneration, sulfur disposal, effecient and continuous operation, etc. Because of these difficulties and economic feasability, no commercial liquid process is on the market in the United States at this time. However, three reasonably successful processes of this type are in use abroad. (1) Thylox process — Employs an alkaline arsenious oxide absorbent solution to obtain 99 per cent removal. Regeneration is accomplished by aeration and free sulfur recovered as a suspension. Gas purified by this method would not come up to town gas standards. (2) Girbotol process — A 50 per cent solution of monoethanolamine is used for absorption and this is regenerated by heat. The absorbent does absorb carbon dioxide from the gas and desired efficiency for sulfur removal is not achieved at normal pressures. (3) Alkazid process — An aqueous solution

of organic solids serves as the absorbing medium. In all other respects this process is very similar to the Girbotol process. The advantages of the oxide process are reviewed and difficulties encountered are discussed in detail including: ground space required, time element in changing boxes, irregularity of labor demands, unpleasant nature of box work and behavior of oxide in use. The progress made in improving oxide purification processes is discussed. Topics mentioned are: dry lute, revivification "in situ", application of mechanical appliances, deep boxes, purging boxes before emptying and tower purifiers. Considerable detail was given on tower purification. Construction, capacity, efficiency, operation, changing and fouling of oxide, labor, control, cost of installation and operation, ground space and other advantages are fully treated. Future developments, ideas and suggestions for the improvement of purifying units are briefly outlined.

--H. Hakewill

GAS ENRICHMENT

Andrews, R.S. RESEARCH IN THE GAS INDUSTRY: COMPLETE GASIFICATION. *Gas Times* 43, 22-24, 1945 (May 12).

Two methods of gas enrichment are discussed with the intention of making the British gas industry independent of paraffin base petroleum which can be used to much better advantage in cracking. The first method involves the gasification of continuous vertical retort tar, of which over 20 million gallons are available annually in Britain. Because of the paraffinoid nature of this tar, a large gas yield is obtained when subjected to "cracking" at atmospheric pressure and suitable temperature. Pilot plant results obtained in tar gasification are subsequently shown in tables. The second method consists in the enrichment of blue gas with methane produced by synthesis from the constituents of the blue gas itself. This process, developed over three years of research, involves three stages: (1) simultaneous removal of organic sulfur by steam and catalyst to increase the CO/H_2 ratio to 1/2; (2) synthesis of methane at 525°F. with a nickel alumina catalyst at atmospheric pressure and space velocity of 800; (3) removal of CO_2 down to 3 per cent by washing with potassium carbonate. During this research the small laboratory model operated continuously for 1500 hours, producing a gas of 916 Btu after the removal of CO_2, in the laboratores of the Metropolitan Gas Company. The British Gas Research Board has regarded this problem to be of sufficient importance as to become one of their major items for continued research on pilot plant scale.

--J.J. Sebastian

PRODUCER GAS

Pearson, B.M. THE BLAST FURNACE AND CARBONISATION PRACTICE. *Gas Times* 43, 21-24, 1945 (April 28).

The author reports the similarity between the blast furnace and carbonisation practice. Blast furnace produces enormous volumes of poor but cheap producer gas, which is widely used in the productive stages of steel making. It is unecomonic to transport blast furnace gas; therefore, it is used in the locality where it is produced. The gas is made use of in the

production of power as in steam boiler-turbo generator. In metallurgical purposes, the gas has many advantages because of the absence of sulfur and its low hydrogen content. With the advent of metal recuperator the blast furnace gas, even with its low calorific value, may attain the high temperatures required in metallurgical furnaces.

--M. Miyaji

PRODUCER GAS

Embling, P.M.K. THE GASIFICATION OF BITUMINOUS COAL IN PRODUCERS. *J. Inst. Fuel* 18, 114-123, 1945 (April).

The gasification of bituminous coal in producers is a single stage process having economic and technical aspects. The fuel gas produced can be delivered either in hot raw or in purified forms. Hot raw gas at temperatures of 1290-1470°F. may be used for glass melting, steel melting, or any other purpose where a high degree of purity is not required. The raw producer gas contains some impurities, composed mostly of tarry matters, dust and carbon. In order to purify this gas and remove suspended impurities it is necessary to cool the gas before subsequent cleaning. When bituminous coking coal is charged it is necessary to apply agitating devices, but when low volatile bituminous and non-caking coals are charged no agitation is necessary. Three plants are described in which "Power Gas Corporation Ltd." mechanical gas producers are used. These supply fuel gas for consumption in steel mills, for gas-fired chemical furnaces, heat treatments, etc. Raw gas containing impurities of 814-1222 grains/100 cu. ft. passes to the cleaning plant composed of a dust washer, two-centrifugal tar washing booster-cleaners, Lymn washer (with sloped splash plates), secondary centrifugal cleaners and dry purification boxes. Operating results obtained in three plants are tabulated and reviewed.

--W. Stopowy

4. NATURAL GAS

DEHYDRATION

Russell, G.F. DEHYDRATION OF NATURAL GAS WITH DIETHYLENE GLYCOL. *Petroleum Eng.* 24, 99-102, *1945 (April)*

A general discussion of natural gas dehydration with liquid absorbents, followed by a chart and table giving the important properties of diethylene glycol and a graphical calculation of the relation between number of plates and glycol circulation rate for various dew-point depressions with glycol concentration as parameter.

—B. Miller

ECONOMICS

Schmidt, E.F. EXPORTATION OF NATURAL GAS. *Am. Gas Assoc. Monthly* 27, *203-205, 1945 (May).*

Restriction of the exportation of natural gas from Texas would seem to be unreasonable. Texas gas reserves are greater in proportion to annual production than Texas oil reserves, yet stopping exportation of oil from Texas has not been suggested. Wastage of natural gas in Texas should be reduced. Utilization of casing-head gas, enabling dry gas to be retained in the reservoir, is an important method of conservation. Utilization of casing-head gas for fuel is necessary to make the gathering of it economical. While gas produced in Texas is transported to other states, many Texas consumers use gas produced in other states. Promotion of the industrial development of Texas cannot be assured by retaining the gas in Texas because fuel costs no more than 5 per cent of the total cost of manufacture and distribution, and other prime factors influence the location of industries. Moving natural gas to distant markets for use as fuel has brought tremendous wealth to the people of Texas and has been instrumental in reducing waste. Just as new building materials have been developed to take the place of depleted timber resources, new fuels will dissipate the fear that the nation will find itself with insufficient natural gas. Only by encouraging the widest possible market and use for gas can Texas realize its fuel value.

—B. Miller

HELIUM

HELIUM HANDLING IN TEXAS: UNDERGROUND STORAGE AND FEATURE OF HIGH PRESSURE TRANSPORT LINE. *Am. Gas J.* 162, *49, 1945 (May).*

Wheeler, H.P. NEW HELIUM PLANTS OF THE BUREAU OF MINES. *Mining and Metallurgy* 26, *245-248, 1945 (May).*

A description of the process of extraction of helium from natural gas which has been tested by the Bureau for helium contents. The commercial uses of the gas are outlined.

4. NATURAL GAS

RECOVERY

Hill, W.B. THREE PRACTICAL WAYS TO REDUCE GAS VENTING. *Oil Weekly* 117, 48, *1945 (May 7)*.

Waste of gas in Texas includes gas vented at natural gasoline and similar plants, gas produced in large oil fields, and gas produced by oil wells having high gas-oil ratios. A large fraction of the gas being wasted at gasoline plants could be conserved by installation of compressors and connecting facilities could be collected and sold to gas transmission lines if oil well owners were not afraid that their wells would then come under the authority of the Federal Power Commission. Repairing and reworking wells which have high gas-oil ratios would keep gas in the ground as would a program of transferring oil allowables from high ratio wells to low ratio wells.

--B. Miller

REFINING

KANSAS SOUR GAS ECONOMICALLY SWEETENED THROUGH SMALL PLANT. *Oil Gas J. 44, 123-125, 1945 (May 19)*

RESERVOIRS

Williams, N. CARTHAGE AREA HOLDS PROMISE OF BECOMING WORLD'S LARGEST GAS RESERVE. *Oil Gas J. 44, 102-103, 109-110, 1945 (May 19)*.

The Carthage area is located in Panola County, eastern Texas. Ultimate recovery, considering reservoir efficiency, will run from about 2.5 to 3 trillion cu. ft., it is estimated.

Dahlgren, E.G. HUGETON: THE STORY OF THE WORLD'S LARGEST DRY GAS FIELD. *Gas 21, 17-22, 1945 (May)*.

Hugeton-Guymon field covers territory in Kansas, Oklahoma and Texas. One estimate for the field is a total of 26.6 trillion cu. ft. with a 50 lb. abandonment pressure.

--Excerpt from article.

STORAGE

Goodman, J.V. TEN YEARS OF UNDERGROUND GAS STORAGE. *Gas Age 95, 33-37, 1945 (May 3)*

Gas storage to take care of large amounts of excessive gas brought about by competitive drilling, or periods of business distress, etc., can be arranged in large underground pools having a capacity of some 40-50 million MCF of gas. During the past ten years, the major operating gas companies of the Appalachian area have availed themselves of underground gas storage units. This operation consists of returning either artificial or natural gas at high pressures to old, depleted or partially depleted gas sands during the off-peak summer months, making it available during peak winter months. The technology of underground storage of gas can be classified as one of the few tools which has definitely prolonged the life of the industry. There are two kinds of reservoirs: those which originally were barren of natural gas or oil, such as abandoned or watered out coal mines, for low pressure storage; and those which have originally produced natural gas or oil, most of them being "stratagraphic traps". In some of the latter type reservoirs gas is stored at 600 lbs. rock pressure holding from 300,000 to 3,000,000 MCF of gas, with a delivery rate of 16,500 to 40,300 MCF of gas per day. The method of locating and operating underground gas-storage reservoirs is discussed by the author.

--J.J.S. Sebastian

5. FUELS AND COMBUSTION

COMBUSTION

Institute of Fuel and the National Smoke Abatement Society. A REPORT OF THE JOINT CONFERENCE ON SMOKE ABATEMENT. *London, National Smoke Abatement Society, 1945.*

A number of papers discussing the pollution problem with emphasis on necessity for finding a solution. Five per cent of coal that is burned enters the air as pollution, amounting to 100 tons/sq.mi./yr. in Great Britain. Possible solutions include improved burner design; use of coke or precarbonized coal, gas scrubbing and electrostatic precipitation. Papers presented were:

Dobson, G.M.B. Atmospheric Pollution
Markham, S.F. Coal and Civilization
Duguid, S.N. Small Scale Steam Raising Plant
Bruce, J. Generating Stations
Sarjant, R.J. Industrial Furnaces
Rowden, E., Noble, W., and Green, A.T. Smoke Abatement in the Clay Industries.
Blackie, A. Atmospheric Pollution from Domestic Appliances
Bennett, M.G. Railway Smoke

—W. Volk

FURNACES

Seil, G.E. AN ANALYSIS OF OPEN-HEARTH COMBUSTION. *Steel* 116, *124, 172, 176-180, 1945 (May 14).*

Conventional open-hearth furnace operates with a low rate of heat transfer, burner to bath. Seil proposes a combustion practice where higher rate of heat transfer may be obtained without injury to the refractories. Radiation is suggested. To obtain maximum radiation, highest possible flame temperature is essential. This temperature is reached by mixing the fuel and air in such molecular proportion that the chemical reaction can be completed in the shortest time. The velocity of the fuel-gas mixture leaving the burner should be high enough so that the ignition is less than the velocity of the mixture, and remains so until the mixture has reached a point at least 12 in. from the burner opening. This distance protects the brick wall. The flame should be 12 in. above the bath to insure high rate of heat transfer. Angle between the centerline of the burner and the bath should be limited to a maximum of 15° to take care of flame expansion. For controlled operation, a constant Btu input per burner is important. A controlled amount of fuel is passed to the burner using a pump governed by a constant speed motor and a variable speed transmission. Advantages of this combustion practice are a maximum fuel efficiency with lower cost of refractories per ton of steel produced and a saving in furnace time.

—M. Miyaji

GASOLINE

Vivian, C.H. 100-OCTANE GASOLINE. *Compressed Air* 50, *130-141, 1945 (May).*

A comprehensive general review of the history and present status of gasoline production, with particular emphasis on aviation gasoline and the new techniques including catalytic cracking by the Houdry, TCC and Fluid Catalyst processes.

—G.D. Creelman

5. FUELS AND COMBUSTION

GASOLINE, NATURAL

Jacomini, V.V. GREATER LIGHT-ENDS RECOVERY IS DESIGN TREND IN NATURAL GASOLINE PLANT CONSTRUCTION. *Natl. Petroleum News* 37, R-323-325, 1945 (May 2).

The increasing call for liquefied petroleum gases to meet war needs and the the necessity of conserving natural resources by pressure maintenance projects has had considerable effect on the design of natural gasoline plants. In this article the author discusses changes in design and engineering features of natural gasoline and cycling plants brought about by the war and forecasts the future trend in plant construction.

—Author's abstract

6. PETROLEUM

LP - GAS

Harts, W.H. LIQUEFIED PETROLEUM GASES. *Oil Weekly 117, 33-35, 1945 (May 7).*

A general review of the history and status of LP-gas.

PETROLEUM

Weil, B.H. SYNTHETICS FROM PETROLEUM. *Petroleum Eng. 16, 198-208, 1945 (May)*

A general discussion with special emphasis on 1945 statistics for the industry. New developments in plastics are detailed. The names of many companies active in this field are mentioned.

—B. Miller

PETROLEUM REFINING - CATALYTIC CRACKING

Buell, A.E. and Skinner, B. CATALYTIC CRACKING OF TEXAS PANHANDLE GAS OIL BY CYCLOVERSION PROCESS. *Oil Gas J. 43, 87-89, 1945 (May 5).*

A commercial unit charging 10,000-12,000 bbl. per day of gas oil has been in operation since June, 1944. An olefinic gasoline (85-110 Bromine No.) of 76-77 octane, A.S.T.M. method, is produced. Natural catalyst is utilized in 4-10 hour cracking periods and substantial desulfurization is effected. Steam dilution reduces carbon deposition (1-2 weight per cent of oil charged) during the cracking period and aids in carbon removal in catalyst regeneration. Operating economies also are attributed to the relatively high operating pressures (75-85 psi).

—C.H. Riesz

PETROLEUM REFINING - FLUID CATALYTIC CRACKING

Carlsmith, L.E. and Johnson, F.B. PILOT PLANT DEVELOPMENT OF FLUID CATALYTIC CRACKING. *Ind. Eng. Chem. 37, 451-455, 1945 (May).* (A paper presented before the Division of Petroleum Chemistry at the 108th meeting of the American Chemical Society).

A general article on pilot plant development of fluid catalyst units. Data from reactors 2 in., 15 in. and 15 ft. in diameter correlate well.

—G.D. Creelman

THE FLUID CATALYTIC CRACKING PROCESS DIAGRAMATICALLY SHOWN STEP BY STEP. *Petroleum Refiner 24, 128, 1945 (May)*

Simplified process diagram by the M. W. Kellogg Company.

PETROLEUM REFINING - HOUDRY CATALYTIC CRACKING

Ardern, D.B., Hewton, R.H., and Barcus, G.I. CATALYTIC CRACKING OF CUTS FROM COASTAL CRUDE. *Ind. Eng. Chem. 37, 546-551, 1945 (June).*

Cuts of Coastal crude oil with A.S.T.M. midboiling points of 307°, 406°, 543°, and 687°F. were cracked over Houdry synthetic silica-aluminum a catalysts at conditions of temperature (650-900°F.) and space velocity (0.2-2.0) chosen to obtain variation in the severity of cracking. The composition of the cracked products was found to vary regularly with the severity of cracking. The increase in aromatics was always less than the

decrease in naphthenes. Only about 40 per cent of the naphthenes destroyed appeared as aromatics. At conditions of reasonably constant severity, the total production of olefins increased with increasing boiling range, while total isoparaffin production decreased. The ratio of iso to normal saturated hydrocarbons did not appear to vary appreciably with charging stock or cracking conditions.

--Excerpt from Author's abstract

PETROLEUM REFINING - THERMOFOR CATALYTIC CRACKING

Godwin, J.B. and Kennedy, R.B. OPERATION OF THE FIRST COMMERCIAL TCC UNIT. *Petroleum Eng.* 16, 176-184, 1945 (May).

The article describes the operation of the TCC (thermofor catalytic cracking) unit at the Magnolia Petroleum Company at Beaumont, Texas. It has a flow diagram and several tables of yields.

--L.A. Mekler

Simpson, T.P. TCC LIQUID PROCESSING. *Petroleum Eng.* 16, 230-234, 1945 (May).

Gives a short history of the development of the TCC process. Then it describes the liquid charge, gives charts of properties of typical stocks, and typical yields.

Simpson, T.P. T.C.C. ANNOUNCES LIQUID PROCESSING USING PELLETED CLAY OR BEADED CATALYST. *Oil Gas J.* 44, 68-90, 1945 (May 12).

The TCC unit can be used to crack residual oil by spraying preheated material on the moving bed of hot catalyst.

--G.D. Creelman

Kunkel, J.H. PAULSBORO TCC UNIT DESIGNED FOR TREATING OR REDUCED CRUDE CRACKING OPERATIONS. PART II. CATALYST ELEVATORS. *Petroleum Eng.* 16, 142-144, 1945 (May).

The mechanical features of the TCC unit at the Paulsboro refining plant of Socony-Vacuum Company are described with particular reference to the design of the bucket elevator for the catalyst. The elevator has a capacity of up to 130 tons per hour for catalyst weighing 40-45 lbs./cu. ft. and handles catalyst at 925°F. Detailed description of construction and material specifications for various parts are given.

--L.A. Mekler

7. ANALYTICAL METHODS AND TESTS

CARBON OXIDES - ANALYSIS

Brown, E.H. and Felger, M.M. DETERMINATION OF OXIDES OF CARBON IN HYDROGEN-NITROGEN MIXTURES. *Ind. Eng. Chem., Anal. Ed.* 17, 277-280, 1945 (May).

Apparatus and procedure for the continuous, separate, or simultaneous determination of carbon dioxide and carbon monoxide in concentrations of 0-100 ppm has a precision of at least 3 ppm. Carbon dioxide is absorbed in an electroconductometric cell and the conductivity of the solution is related to the concentration by calibration. Carbon monoxide, after oxidation by an improved iodine pentoxide reagent, is determined as carbon dioxide.

—C.H. Riesz

Brown, E.H. and Felger, M.M. CONTINUOUS DETERMINATION OF CARBON DIOXIDE BY ELECTROCONDUCTIVITY. *Ind. Eng. Chem., Anal. Ed.* 17, 283-284, 1945 (May).

The electroconductometric analyzer for the continuous analysis of carbon oxides is adapted to gases containing 0-2 per cent of carbon dioxide. In checks against gravimetric determinations the results were accurate to about ± 0.03 per cent.

—C.H. Riesz

Brown, E.H., Felger, M.M., and Howard, R.B.Jr. CONTINUOUS DETERMINATION OF CARBON MONOXIDE IN CONCENTRATIONS UP TO 3.5 PER CENT BY ELECTROCONDUCTIVITY. *Ind. Eng. Chem., Anal. Ed.* 17, 287-289, 1945 (May).

The electroconductometric analyzer has been adapted to the continuous determination of carbon monoxide in the range 0-3.5 per cent. The sample is diluted with air and the carbon monoxide is oxidized over hot copper oxide to carbon dioxide which is determined by the electroconductometric method described previously. The analyzer is calibrated against mixtures of known composition and its accuracy is presumed to be better than that of an Orsat analysis.

—C.H. Riesz

GASES - ANALYSIS

Biggs, N.B. DETECTION OF GASES IN AIR AND IN OTHER GASES. *Gas World* 122, 430-432, 1945 (May 5).

Methods are reviewed for detection of combustible gases, carbon monoxide, sulfur dioxide, carbon disulfide, hydrogen sulfide, benzene and toluene, hydrocyanic acid, nitric oxide, and oxygen. Forty one references are given.

—C.H. Riesz

Brown, E.H. and Cline, J.E. DETERMINATION OF ARGON IN AMMONIA-SYNTHESIS GASES. *Ind. Eng.Chem., Anal. Ed.* 17, 286-287, 1945 (May).

An apparatus for the continuous determination of the argon-nitrogen ratio in ammonio-synthesis gas is described. The gas is scrubbed free of ammonia, the hydrogen and methane are oxidized at 700°C. with a copper oxide-iron oxide mixture, the oxidation products are removed, and the purified argon-nitrogen mixture is passed through a commercial thermal conductivity instrument which continuously records the argon content.

—Author's abstract

7. ANALYTICAL METHODS AND TESTS

GASES - ANALYSIS

Dudden, W.R. THE ESTIMATION OF SMALL QUANTITIES OF NITRIC OXIDE. *Gas World* 122, 276-7, 1945 (March 24).

Nitric oxide in concentrations of less than 1 ppm in coal gas is determined by quantitative conversion to nitrogen peroxide which is then reacted with the Griess reagent and evaluated colorimetrically. A unique apparatus is described for washing the gas while contacting the nitric oxide with nascent oxygen from an electrolytic cell. The diazo compound formed is matched against a Lovibond tintometer and nitric oxide concentration calculated from this data. Long period tests can be made and the use of a photo-electric matching unit makes it possible to continuously record changes in nitric oxide concentrations.

--H.C. Hakewill

Neie, W. A SIMPLIFIED METHOD OF FLUE GAS ANALYSIS FOR COMBUSTION CONTROL. *Gas Times* 43, 21, 1945 (May 12). Translated from *Gas- und Wasserfach* 86, 212, 1943.

An apparatus and method covered by a German patent is described for a rapid determination of oxygen and carbon monoxide in flue gases. The gas is freed from CO_2 by sucking the sample through a filter filled with granular soda-lime. The CO_2-free sample is then measured in the burette for the conventional absorption of O_2 and CO. As an example, where producer gas made from coke is used as the heating agent, the oxygen content, in terms of flue gas containing CO_2, is given by the following formula:

$$\text{Oxygen} = \frac{\text{cc. found by analysis} \times 79.2}{100 - \text{cc. found by analysis}}$$

For practical work, a curve may be prepared from this formula. A feature of this new apparatus is the employment of a measuring burette which is calibrated so that the respective measuring divisions incorporate the factor employed in the calculation. Thus, the correct percentage is directly read off on the burette after the absorption without reference to tables.

--J.J. Sebastian

Rowe, R.A. SAMPLING REGENERATOR OUTLET FLUE GAS TO DETERMINE CHANGE IN OXYGEN CONTENT. *Petroleum Eng.* 16, 187-196, 1945 (May).

An arrangement for drawing samples from dust laden hot steam at high temperatures from the regenerator of a fluid catalytic cracking unit for continuous analysis in an electrical oxygen detector is described. A 1/4 in. 18-8 tube cemented to a standard 1 in. ball stone filter ground to a 5/8 in. diameter cylinder is used as the sampling tube. Extra heavy 18-8 nipple welded into the shell of the line from which the sample is taken acts as the sample connection and housing for the sample hole. A valve in the 1 in. line is provided to shut this line off in case the sample tube has to be withdrawn for inspection. Detailed drawings and instructions for assembly are given.

--L.A. Mekler

7. ANALYTICAL METHODS AND TESTS

GASES - ANALYSIS

PRESSURE ANALYSIS OF THE MINOR CONSTITUENTS OF COAL. *Gas Times* 43, 30-31, *1945 (May 26)*.

A method is presented for the determination of hydrogen sulfide, hydrogen cyanide, ammonia and other constituents by absorbing them under pressures up to 10 atmospheres, thereby shortening the time of reaction materially. Ordinary glass absorption towers are used and the design of a pressure compensating jacket for them is given.

--L.B. Bischmann

HYDROCARBONS - ANALYSIS

Jones, L.C.,Jr., Friedel, R.A., and Hinds, G.P.,Jr. NEOPENTANE IN REFINERY BUTANES. *Ind. Eng. Chem., Anal. Ed.* 17, 349-351, *1945 (June)*

Neopentane was found in a straight-run refinery butane stream by means of infra-red spectrometry. A spectrophotometric method is described for qualitative analysis of the system propane, n-butane, isobutane, neopentane and isopentane. The neopentane present in such streams from several Texas crudes amounted to 0.4 to 0.6 mole per cent which corresponds to about 0.03 mole per cent of the total crude. This is the first definite evidence of the presence of neopentane in crude oil.

--C.H. Riesz.

Mair, B.J. SEPARATION AND DETERMINATION OF AROMATIC AND MONOOLEFIN HYDROCARBONS IN MIXTURES WITH PARAFFINS AND NAPHTHENES BY ADSORPTION. *J. Research Natl. Bureau Standards* 34, 435-451, *1945 (May)*.

A new method based on selective adsorption and desorption of olefin, naphthene plus parrafin, and aromatic hydrocarbons is presented. The mixture to be analyzed (30-50 ml) is introduced into the top of a column of silica gel and when the liquid level just reaches the top of the silica gel a desorbing liquid such as ethyl alcohol is added under a constant pressure (up to 50 psi). The components issue from the bottom of the column in the following order: paraffin plus naphthene, monoolefin, and aromatic hydrocarbons. Determination of the relative liquid volume constitutes the analysis. Analysis of five solutions is given and a procedure is outlined for determining the aromatic content of a straight-run petroleum distillate.

--C.H. Riesz

Sefton, R. A CALORIMETRIC METHOD FOR THE DETERMINATION OF CYCLOPENTADIENE. *J. Soc. Chem. Ind.* 64, 104-106, *1945 (April)*.

A simple, rapid method for the determination of cyclopentadiene in benzene up to 1 per cent by volume is based upon the temperature rise in a specified calorimeter due to the heat of reaction of cyclopentadiene with maleic anhydride. More concentrated solutions may be diluted to the range given. The method is not specific for cyclopentadiene but butadiene, isoprene and piperylene react only slowly in the cold. In commercial practice it was found that the conjugated diolefin content consisted essentially of cyclopentadiene. The method may have other applications, for example cracked gasoline and coke oven gases.

--C.H. Riesz

7. ANALYTICAL METHODS AND TESTS

MINERALS - ANALYSIS

Speil, S., Berkelhamer, L.H., Pask, J.A., and Davies, B. DIFFERENTIAL THERMAL ANALYSIS; ITS APPLICATION TO CLAYS AND OTHER ALUMINOUS MINERALS. *U.S. Bureau Mines, Tech. Paper 664.*

Differential thermal analysis is a relatively new method of identifying a and evaluating clays and related materials. It is based upon the fact that the application of heat to many minerals causes certain physical and chemical changes that are reflected in endothermic and exothermic reactions. By comparing these changes in temperature with those of a thermally inert substance (Al_2O_3) heated under the same conditions a curve or pattern is obtained which is characteristic of the mineral under examination. The apparatus and applications and limitations of this method are discussed.

--V. de Marchi

MOISTURE DETERMINATION

Rennie, R.P. and Monkman, J.L. ELECTROMETRIC END POINT FOR FISCHER REAGENT MOISTURE DETERMINATION. *Can. Chemistry and Process Industries* 29, *366-370, 1945 (May).*

A general method has been developed for the determination of moisture in various materials by means of the Karl Fischer reagent. An electrical unit combining end point indicator, cell and electrode system has been designed and has proved to be satisfactory for this purpose. The method is applicable to both high and low ranges of moisture content and to opaque and colored solutions, such as shellac, thereby overcoming the limitations of the visual end point. The method is considerably more rapid than many of the currently used procedures for moisture estimations, such as oven drying. Detailed methods have been described for the determination of moisture content of gunpowder, glacial acetic acid, commercial sawdust, and shellac solution. Use has been made of a hydrated salt (ammonium oxalate) for the standardization of reagents. This method is considerably more convenient than the use of weighed water samples and is more rapid.

--Author's summary.

POWDERS - SPECIFIC SURFACE

Sharratt, E., Van Someren, E.H.S., and Rollason, E.C. A RAPID OPTICAL METHOD FOR ESTIMATING THE SPECIFIC SURFACE OF POWDERS. *J. Soc. Chem. Ind.* 64, *73-75, 1945 (March).*

The specific surfaces of opaque powders in dilute suspensions are assumed to be proportional to their optical densities. The authors have found this method to be very rapid and useful for routine control work with some powders ranging from 2.5-100 microns in diameter.

—M. Fisher

7. ANALYTICAL METHODS AND TESTS

SPECTROMETRY

Washburn, H.W., Wiley, H.F., Rock, S.M., and Berry, C.E. THE MASS SPECTROMETER. A TOOL FOR CHEMICAL RESEARCH AND INDUSTRY. *Gas* 21, 28-35, *1945 (May)*.

The mass spectrometer has found wide application in the petroleum industry where its greatest utility is in the analysis of hydrocarbon gases and the lighter liquids. A brief discussion of the theory, application and operation of the mass spectrometer is given. Only a small sample is required; a complete analysis can be completed in 30-40 minutes; the accuracy is good. Future developments may lead to wider application of this method as an analytical tool.

--C.H. Riesz

SULFUR - DETERMINATION

Javes, A.R. THE ESTIMATION OF THE SULPHUR CONTENT OF PETROLEUM DISTILLATES. *J. Inst. Petroleum* 31, *129-153, 1945 (May)*

A modified lamp method is presented for total sulphur determination of petroleum distillates and gases. An apparatus was evolved which is capable of burning larger aromatic samples than had previously been reported. Analytical results on the combustion analyses of synthetic ethyl sulfide and carbon disulfide samples indicate a reasonable estimation of sulphur control can be obtained for both the gravimetric and turbidimetric methods. An investigation of apparatus, rates of combustion, air purification and consumption, blanks, and other factors is included.

--E.A. Knaggs

Luke, C.L. DETERMINATION OF TOTAL SULFUR IN RUBBER. *Ind. Eng. Chem., Anal. Ed.* 17, *298-299, 1945 (May)*.

The author describes an extension of his method for the rapid determination of total sulfur in rubber samples as published in Ind. Eng. Chem., Anal. Ed. 15, 602, 1943. The method involves the oxidation of sulfur to sulfate, reduction of sulfate to hydrogen sulfide, absorption of hydrogen sulfide in ammoniacal cadmium chloride, followed by an iodometric titration. Experimental evidence presented in this publication shows excellent recoveries of 5 to 100 mg. sulfur samples, whereas the original paper indicated good results for sulfur samples in the range from 0.05-5.0 mg. The method appears to be applicable for sulfur analyses of alloys as well as other inorganic sulfide and sulfate analyses.

--E.A. Knaggs

8. GENERAL AND PHYSICAL CHEMISTRY

CARBON BLACK

Miller, B. THE CHANGING ECONOMICS OF CARBON BLACK MANUFACTURE. *Chemical Industries 56, 786-788, 1945 (May)* (Condensation of one section of Mr. Miller's paper entitled "Chemical Utilization of Natural Gas" which was presented to the Technical and Research Committee of the Natural Gas Department of the A.G.A. as a report.)

The recent shortage of carbon black has focused new attention on the economics of manufacture of this important rubber compounding ingredient. Here, the author discusses some of the factors influencing costs in this industry, with special emphasis on raw materials.

--Publisher's abstract

CATALYSTS

Schwab, G.M. and Schwab-Agallidid, E. ALLOYS AS CATALYSTS. *Ber. 76, 1228-1250, 1944 (Jan.)* (In German)

A number of metallic systems were investigated as to their catalytic properties. In a system silver-aluminum the heat of activation for the decomposition of ethanol and methanol was measured. These measurements showed that whatever phase of this alloy was used - either the silver rich gamma-phase of this alloy or the aluminum rich delta-"Mischkristelle" - no change in the heat of activation takes place. Similar results were obtained using various phases of a copper-silver and a copper-nickel system. No systematic connection could be found between any particular phase of an alloy and changes in the heat of activation.

--F. Lister

CERAMICS

Silverman, A. (Editor). DATA ON CHEMICALS FOR CERAMIC USE. *Natl. Research Council, Bull. 107, 1943 (June).*

The chemical formula, molecular weight, density, decomposition temperature, refractive index, crystal form, color, and melting, transition, boiling and sublimation points of more than 2200 chemical substances are given. A list of 1128 original references has been appended.

--V. de Marchi

HYDROCARBONS - PHYSICAL PROPERTIES

Wackher, R.C., Linn, C.B., and Grosse, A.V. PHYSICAL PROPERTIES OF BUTANES AND BUTENES. *Ind. Eng. Chem. 37, 464-468, 1945 (May).*

A critical review and correlation of the physical properties of n-butane, isobutane, 1-butene, cis-2-butene, trans-2-butene and isobutylene is supplemented by new experimental determinations. Properties include refractive indices, liquid densities, boiling points, vapor pressures and melting points. Refractive indices, from -10° to -50°C., of these C_4 hydrocarbons are reported. Liquid densities of the four butenes and isobutane were determined from 0°C. to as low as -70°C. Vapor pressures from 20 to 800 mm. measured for n-butane and isobutane substantiate the latest literature data.

--C.H. Riesz

8. GENERAL AND PHYSICAL CHEMISTRY

HYDROCARBONS - PHYSICAL PROPERTIES

Taylor, W.J., Pignocco, J.M., and Rossini, F.D. METHOD FOR CALCULATING THE PROPERTIES OF HYDROCARBONS AND ITS APPLICATION TO THE REFRACTIVE INDICES, DENSITIES, AND BOILING POINTS OF THE PARAFFIN AND MONOOLEFIN HYDROCARBONS. *J. Research Natl. Bureau of Standards* 34, 413-434, 1945 (May).

A theoretical approach to the correlation of certain properties of hydrocarbons leads to a method of calculation which is based on the summation of contributions from components parts of the molecule plus contributions from interaction between adjacent component parts. Parameters were calculated from existing data by the method of least squares. For the paraffins, the calculations were made in terms of the difference between a given normal paraffin and its isomers. For the monoolefins, calculations were made for the difference in the value of the property between a given monoolefin and the corresponding paraffin of the same carbon skeleton. The average deviation of the calculated and experimentals for 33 paraffins and 58 olefins, respectively, were: (a) density, ± 0.00074 g/ml; ± 0.0031 g/ml; (b) refractive index (n_D at 20°C.), ± 0.00042; ± 0.0020; and (c) normal boiling point, ± 0.55°C.; ± 1.33°C.

—C.H. Riesz

HYDROGEN SULFIDE

Bacon, R.F. and Boe, E.S. HYDROGEN SULFIDE PRODUCTION FROM SULFUR AND HYDROCARBONS. *Ind. Eng. Chem.* 37, 469-474, 1945 (May)

Hydrogen sulfide was prepared in high yield from the reaction of heavy fuel oil and sulfur at 250°C. The cost of raw materials per pound of H_2S produced is approximately 1.67 cents. Natural gas can also be employed for the reaction. It was found that a two-step reaction is needed if SO_2 is objectionable in the product. In the first step, sulfur is reacted with methane at 600-650°C. in the presence of an alumina catalyst to produce H_2S and CS_2. In the second step, CS_2 is converted to H_2S and CO_2 by means of water vapor at 300-350°C. in the presence of alumina catalyst. The final gases contain H_2S and CO_2 in the volume ratio of 4:1. Small amounts of CS_2, COS and H_2 may be present. The material cost per pound of H_2S is about 1.1 cents.

—C.H. Riesz

Lukes, J.J., Prutton, C.F., and Turnbull, D. EQUILIBRIUM BETWEEN SOLID FERROUS CHLORIDE AND GASEOUS HYDROGEN SULFIDE AT INTERMEDIATE TEMPERATURES. *J. Am. Chem. Soc.* 67, 697-700, 1945 (May)

The equilibrium between ferrous chloride and hydrogen sulfide in a temperature range between 340° and 460° was studied because of the unexpected presence of hydrogen. The Kp data obtained indicates that hydrogen is formed by the following reaction:

$$FeS_{(s)} + H_2S_{(g)} \longrightarrow FeS_i + x\ (s) + x\ H_2\ (g)$$

Evidently a solid solution of sulfur in FeS is formed, and for the stoichometric reaction

$$FeCl_2\ (s) + 1.14\ H_2S\ (g) \longrightarrow FeS_{1.14}\ (s) + 2\ HCl\ (g) + 0.14\ H_2\ (g)$$

the relation $\log Kp = (-4{,}320/T) + 6.71$ was found between Kp and T.

—F. Lister

8. GENERAL AND PHYSICAL CHEMISTRY

ION EXCHANGE

Sussman, S. and Mindler, A.B. ION EXCHANGE. *Chemical Industries* 56, 789-795, *1945 (May)*.

A general discussion of the ion exchange process, including type reactions, type processes, limitations, types of exchangers and equipment. The type processes described include removal of impurities, addition of material, recovery of material, separation of electrolytes, contact materials (catalysts) and miscellaneous uses. The principal limitation is that of capacity so that the process can be applied only to low concentrations. Sixty-nine references.

--A.J. Rudnitzki

RADIATION

Baulk, R.H. THE MEASUREMENT OF FLAME EMISSIVITY. *British Coal Utilization Research Assoc. Monthly Bull.* 9, *33-39, 1945 (February)*.

Radiation from flames takes place by two distinct mechanisms, non-luminous radiation, principally infra-red, from the hot gases, and visible and infra-red radiation from solid particles. The more easily cracked gases, such as the unsaturated hydrocarbons, give rise to these particles, and therefore burn with luminous flames, while oxidation of saturated gases occurs so much more rapidly than cracking that production of a luminous flame is rather difficult. The importance of flame emissivity measurements is discussed and methods of measurement are described. These include radiometer methods which embrace both the visible and infra-red regions and optical methods which use only the visible range.

--S. Katz

9. ORGANIC CHEMISTRY

BITUMEN

Jackson, J.S. BITUMEN AND THE BITUMEN INDUSTRY WITH SPECIAL REFERENCE TO ASPHALTIC BITUMEN. PART I. HISTORICAL AND TECHNICAL SURVEY. *Petroleum* 8, 82-84, *1945 (May)*.

This series of six articles has been written with the aim of giving up-to-date and all-round information on those natural and processed materials commonly termed asphalts and bitumens, their history, extraction, production, blending, properties and applications. Although there are some books in existence, and articles in various periodicals, an expert present-day account was most desirable. The introductory article gives a brief historical and technical survey, featuring the properties and the numerous applications of lake asphalt, rock asphalt, asphaltic bitumen, and coal tar, together with their official definitions. The second instalment describes the manufacture of asphaltic bitumen and the methods of plant control, with brief reference to lake and natural asphalt, coal tar and coal-tar pitch. In the third article, an investigation is made into constitution and properties of the products discussed and their relations to practical performance. Testing methods and the significance of the tests, and road making, hot-mix processes, cutbacks and emulsions will be the contents of the fourth and fifth articles. Reference will also be made to soil stabilization and aerodrome construction. In the concluding article the author reviews various industrial applications such as roofing felt, electric cables, emulsions, tank lining, hydraulic engineering, etc.

—Publisher's abstract

BUTANE - ISOMERIZATION

Powell, T.M. and Reid, E.B. INVESTIGATION OF THE MECHANISM OF BUTANE ISOMERIZATION USING RADIOACTIVE HYDROGEN AS TRACER. *J. Am. Chem. Soc.* 67, *1020-1026, 1945 (June)*

Results are presented for tritium (radio-active hydrogen) exchange between hydrogen, hydrogen chloride and butanes during isomerization over aluminum chloride catalysts. Exchange of tritium in hydrogen chloride to butane is large compared to exchanges of tritium in hydrogen (HT) to butane. The existence of a butane-$AlCl_3$ complex and the formation of $HAlCl_4$ during isomerization are indicated by the results. A mechanism which explains the data qualitatively as well as a general mechanism of hydrocarbon isomerization are presented.

—C.H.Riesz

FISCHER-TROPSCH SYNTHESIS

Komarewsky, V.I. PRODUCTION OF SYNTHETIC LIQUID FUEL FROM NATURAL GAS. *Petroleum Refiner* 24, *170-176, 1945 (May)*.

A general review of the production of synthetic liquid fuels from natural gas by means of the Fischer-Tropsch process.

9. ORGANIC CHEMISTRY

HYDROCARBONS

THE HYDROCARBON OIL REPORT. *Coke 7, 88-90, 1945 (May)*

A summary is given of the report recently issued by the Hydrocarbon Oil Duties Committee appointed in January 1944 by the British government. The report deals with the effect of the hydrocarbon oil duties on the supply of raw materials to, and the development of, the chemical industry in Britain so far as the use of hydrocarbons and their derivatives is concerned. The extent to which any change in those duties would affect the industries engaged in making similar products from coal is discussed in the report to considerable detail. The term "chemical industry" is defined as industries processing hydrocarbon oils with objective of transforming them into various chemical products.

--J.J.S. Sebastian

HYDROCARBONS, CHLORINATED - OXIDATION

Faith, W.L. OXIDATION OF CHLORINATED HYDROCARBONS TO MALEIC AND FUMARIC ACIDS. *Ind. Eng. Chem. 37, 438-441, 1945 (May).* (A paper presented before the Division of Industrial and Engineering Chemistry at the 108th meeting of the American Chemical Society)

Eight different mono- and poly-chlorinated hydrocarbons were oxidized by air over vanadium pentoxide catalyst on six different carriers and the effects of temperature, space velocity, feed-mixture, catalyst carriers, pressure and diluents were determined. It was found possible to vary the proportion of maleic and fumaric acids at will.

--L.J. Kane

HYDROCARBONS - HYDROGENATION

Bridgwater, R.M. BRITISH RESEARCH ON PETROLEUM SUBSTITUTES. PART V. HYDROGENATION OF TAR PRODUCTS. *Petroleum 8, 68-70, 1945 (April).*

For the purpose of obtaining motor fuels from low temperature and also high temperature tars, a process of hydrogenation-cracking has been developed. The process involves three chemical steps, namely, addition of hydrogen to unsaturated compounds, elimination of oxygen, nitrogen and sulfur, and conversion of aromatics to naphthenes. Since the behavior of many pure compounds under conditions used in this process was not known, a simultaneous study of the hydrogenation of pure compounds was made. Under non-catalytic conditions, 450°C. and 100 atm. pressure gave best results. Using catalytic agents it was found that molybdic acid and sulfur supported on active carbon gave satisfactory results at 400°C. Experimental results on large and small scale pilot plants are mentioned.

--F. Lister

HYDROCARBONS-OXIDATION

Hass, H.B., McBee, E.T., and Churchill, J.W. OXIDATION OF HEXADECANE. *Ind. Eng. Chem. 37, 445-448, 1945 (May)* (A paper presented before the Division of Industrial and Engineering Chemistry at the 108th meeting of the American Chemical Society)

Hexadecane treated with a small amount of air at 190 to 300°C. and a pressure of 2000 psi gave a mixture of oxygenated compounds which were hydrogenated to alcohols of high molecular weight, valuable as wetting agents, synthetic waxes, insecticides, etc. Maximum yield was 17 per cent.

—L.J. Kane

9. ORGANIC CHEMISTRY

HYDROCARBON SYNTHESIS

Grummitt, O., Sensel, E.E., Smith W.R., Burk, R.E., and Lankelma, H.P. THE ACTION OF ALUMINUM BROMIDE ON PARAFFIN HYDROCARBONS. Part I. N-HEXANE AND N-HEPTANE. *J. Am. Chem. Soc.* 67, *910-914, 1945 (June).*

The action of aluminum bromide with hydrogen bromide as promoter led to cracking, isomerization and alkylation with the formation of branched chain paraffins containing methyl groups in the 2-position. Cracking was preceded by isomerization, and under mild conditions, isomerization was the chief reaction. No cycloparaffins, aromatics or normal paraffins were formed.

--C.H. Riesz

Bishop, J.W., Burk, R.E., and Lankelma, H.P. THE ACTION OF ALUMINUM BROMIDE ON PARAFFIN HYDROCARBONS. PART II. BRANCHED CHAIN HEXANES. *J. Am. Chem. Soc.* 67, *914-918, 1945 (June).*

Under the action of aluminum bromide promoted by hydrogen bromide, 2-methylpentane or 3-methylpentane was isomerized to an apparent equilibrium mixture of the two. However, 2, 2-dimethylbutane was not appreciably isomerized and its formation from other hexanes was correlated with cracking. Neopentane and normal paraffins were absent in all reaction products identified.

--C.H. Riesz

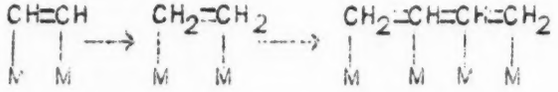
Sheridan, J. THE METAL-CATALYZED REACTION BETWEEN ACETYLENE AND HYDROGEN. PART I. *J. Chem. Soc. 1944, 373-380 (August)*

Hydrogenation of acetylene over nickel-pumice catalyst leads not only to the formation of ethylene and ethane, but also to reduced polymers of acetylene. The total pressure drop gives some straight line function where catalysts of steady activity are used and is fairly independent of the initial hydrogen-acetylene ratio. With respect to hydrogen the reaction is of first order and with respect to acetylene of zero order. A mechanism as previously proposed by other workers is again based on the formation of metal carbides of organo-metallic compounds.

--F. Lister

Sheridan, J. THE METAL-CATALYZED REACTION BETWEEN ACETYLENE AND HYDROGEN. PART II. *J. Chem. Soc. 1945, 133-142 (March)*

The effect of temperature on the catalytic hydrogenation of acetylene is studied. It was found that temperature has no effect on the order of the reaction but that the lower the temperature the less reduced polymers of acetylene are produced. The activation energy for the formation of ethylene was estimated at 10.9 kg.cal. and the activation energy for the higher polymers of acetylene was estimated between 12.7 and 14.5 kg.cal. The hydrocarbons containing more than two carbon atoms were n-hexane, 3-methylpentane and probably n-butane. In addition small amounts of other branched hydrocarbons are assumed to be present. The mechanism of the reaction is again based on the formation of organic metallic compounds of the following type:



Branching of hydrocarbons is tentatively explained by a projection of the face (110) of nickel crystals.

--F. Lister

9. ORGANIC CHEMISTRY

HYDROCARBON SYNTHESIS

Wagner-Jauregg, T. and Lennartz, T. THE POLYMERIZATION OF ISOPRENE THROUGH THE ACTION OF CLAYS; SYNTHESIS OF AN ALIPHATIC DIISOPRENE (PART V OF THE SERIES: ABOUT POLYMERIZATION REACTIONS OF DIENES) *Ber.* 76, *1161-1165, 1944 (Jan.)* (In German)

Through the usage of specially activated clays such as "Clarit" it was possible to stop the polymerization of isoprenes at the dimer stage. However, the dimer so far has not been successfully purified.

—F. Lister

HYDROCARBONS-SULFOCHLORINATION

Asinger, F. PRODUCTS OF THE SIMULTANEOUS REACTION OF SULFUR DIOXIDE AND CHLORINE ON ALIPHATIC HYDROCARBONS IN THE PRESENCE OF ULTRAVIOLET LIGHT. PART IV. PRODUCTS OF THE SIMULTANEOUS REACTION OF CHLORINE AND SULFUR DIOXIDE WITH N-DODECANE. *Ber. 77B, 191-194, 1944 (April) (In German)*

In a series of articles the author investigated the products of substitution reactions of higher paraffins. As reported previously substitution takes place in such a way that all possible mono nitro isomers are obtained in about equal amounts. The same holds true for the simultaneous sulfochlorination, whereby substitution takes place according to a statistical average. This average is about the same whether halogenation, nitration or sulfochlorination is the substitution reaction. The products which are sulfochlorides were freed of sulfur dioxide in accordance with the following reaction:

$$R.SO_2Cl \xrightarrow{\Delta P} RCl + SO_2$$

The chlorides were then identified in the usual manner.

—F. Lister

ORGANIC SULPHUR

Nelson, W.L. REDUCING SULFUR BY COBALT MOLYBDATE. *Oil Gas J. 44, 123, 1945 (May 12).*

The desulfurization of high-sulfur gasoline stocks by a cobalt molybdate catalyst in a hydrogenation process has been developed through the pilot plant stage by the Union Oil Company of California. In the process, sulfur compounds, even the very stable thiophenes and disulfides, are decomposed into hydrogen sulfide which can be fractionated out of the final gasoline or removed by caustic scrubbing. The process is said to permit operation at only 650-700°F. and to operate for long periods without decreases in catalyst activity. Products containing only 0.01-0.02 per cent sulfur were produced from 0.63-3.0 per cent sulfur stocks. The products contain relatively large amounts of gum.

—C.B. Folkroa

OXIDATION, CATALYTIC

McBee, E.T., Hass, H.B., and Wiseman, P.A. CATALYTIC VAPOR PHASE OXIDATION OF ETHYLENE. *Ind. Eng. Chem. 37, 432-438, 1945 (May).* (A paper presented before the Division of Industrial and Engineering Chemistry at the 108th meeting of the American Chemical Society)

Although the manufacture of ethylene oxide by this method is a well

established industry, this is the first academic article published on the subject. Using a catalyst of silver oxide on corundum, the authors studied the effect of feed mixture, rate of flow, temperature, and age of catalyst. Ethylene dichloride was found to be a satisfactory "anti-catalyst" to decrease CO_2 formation. An interesting method of rapidly determining the activity of a catalyst is described.

—L.J. Kane

OXIDATION, CATALYTIC

Pongratz, A. and Scholtis, K. ABOUT THE THEORY OF CATALYTIC OXIDATION IN THE GASEOUS PHASE. *Ber.* 76, *1179-1187, 1944 (Jan.) (In German)*

The oxidation of naphthalene with vanadium pentoxide leads to phthalic acid over some intermediary stages. At the same time some reduction of the intensity of x-ray spectra is observed. Analysis of the carbon and hydrogen content on the catalyst indicates that the intermediary compound is either naphthoquinone or dioxinaphthoquinone. The catalyst itself does analyze for a mixture of oxides rather than for a pure reduced compound. The equilibrium $V_2O_5 \rightleftharpoons V_2O_{5-x} + O_x$ is proposed which will account for the fact that no additional oxygen is needed for the oxidation of naphthalene.

—F. Lister

PROPANE

Bell, F.W. INCREASING PROPANE RECOVERY IN EXISTING NATURAL GASOLINE ABSORPTION PLANTS. *Oil Gas J.* 44, *114-119, 1945 (May 19); Petroleum Refiner* 24, *115-117, 1945 (June)*

10. DEVELOPMENT ENGINEERING

CORROSION

CONTROL OF REFINERY CORROSION DEPENDENT UPON AN ETERNALLY VIGILANT PROGRAM. *Oil Gas J.* 43, 246-248, 252, 255-256, 259, *1945 (March 31).*

Methods of combating corrosion are discussed. Selection of proper metal resistant to the particular corrosion is based on the results of exposure tests. Protective coatings and liners are used to correct corrosion problems. Chrome steel liners are in service on fractionating towers. Galvanized plate and chrome plating, weld-deposited brass coating, and nonmetallic liners and coatings such as plastics, synthetic rubber, and cement give good service. Acidic corrosion may be controlled by neutralization with ammonia. Quachrom glucosate is used as an inhibitor in an absorption oil system. Sodium chromate treatment on water serving condenser and cooling equipment has proved to be successful in retarding corrosion. Electrolytic corrosion may be overcome by establishing cathodic rather than anodic polarity of the unit to be protected with respect to the earth. By electrical precipitation the salt content of crudes may be reduced, thereby reducing acidic corrosion. Free sulfur deposits in the compressors cylinders are reduced by flushing with soluble oil. Mechanical or coalescent type water separators are used separating water from light hydrocarbon to alkylation units in combating corrosion. Mechanical deaeration of cooling water is used to reduce the oxygen content.

—M. Miyaji

DUST REMOVAL

Scharer, O. INDUSTRIAL DUST SEPARATION AND ITS PHYSICAL PRINCIPLES. *Engineers' Digest* 2, 237-238, *1945 (May).* Abstracted from *Schweiz. Bauzeitung* 124, 53-59, *1944 (July 29).*

Some of the factors determining the efficiency of mechanical and electrostatic dust separation are discussed. It is shown that electrostatic separation is relatively more efficient for smaller particles than 5 microns in diameter. Equations are given for the electric field strength and current in tubular type electro-precipitators.

—M. Fisher

ENGINEERING MATERIALS

Black, A. SOME RECENT DEVELOPMENTS IN ENGINEERING MATERIALS. PART IV. GLASSES, WOODS AND GLUES, MISCELLANEOUS MATERIALS, AND PROCESSES. *Mech. Eng.* 67, 334-341, *1945 (May).*

The topics discussed are: glass-fiber applications, special plate glasses, industrial glasses, optical glasses, glass gages, glass bearing jewels; modern glues and plywood, glues for metals, chemical treatment of wood, wood and paper impregnation, impregnated-wood bearings; abrasives, powder metallurgy and sintering, luminescent materials, black finishes, electroplating of nonconductive materials, electropolishing, applications of supersonic vibration, machinability studies, damping properties of engineering materials, refractory materials, hardness-tensile strength conversion tables for metals, double-wall tubing, and corronizing. An extensive bibliography is included.

10. DEVELOPMENT ENGINEERING

HEAT TREATMENT

Young, W.W. THE PLUS AND MINUS OF INDUCTION HEATING. *Am. Gas Assoc. Monthly 27, 235-237, 1945 (May).*

This article deals with heat treating of metals. Induction heating is inefficient, inflexible, and has high maintenance costs as compared to gas fired equipment. Induction heating equipment is also limited in the size of work that can be handled.

—R.C. Gardner

HYDROGEN FLUORIDE ALKYLATION

Findlay, R.A. MECHANICAL OPERATION OF HF ALKYLATION UNITS. *Natl. Petroleum News 37, R-326-328, 1945 (May 2).*

Steel in contact with HF forms iron fluoride scales which must be considered in designing pumps, valves and plugs. Steel internal bolting should not be used. Centrifugal pumps have proven satisfactory. The double Duraseal packing has been supplemented by use of hydrocarbon flush. Combination of Stellite plugs and Monel -coated bodies gives good wear. In HF alkylation units, to avoid localized corrosion, attention should be given to floating head type condenser, and steam preheater tubes and tube sheets. Instruments in use are liquid level indicators, recorders or controllers of the torsion tube type using volumetric displacement floats.

—M. Miyaji

INSTRUMENTS

Rosenberger, A.J. INSTRUMENTATION - A NEW PRINCIPLE IN MEASUREMENT. *Oil Gas J. 43, 276-281, 1945 (March 31).*

The principle of measuring an unknown force against a known force is utilized in the applications discussed here in the development of various control, indicating and recording instruments applicable to petroleum refining. This article explains the principle and the application to vapor pressure-temperature determination, liquid-level indication at extreme pressures, pressure transmission, flow measurement and other purposes.

--Excerpt from publisher's abstract

NOZZLES

DESIGN OF SPRAY NOZZLES. *Engineers' Digest 2, 298-302, 1945 (June)* From *Engineering 159, 21-23, 61-63, 103-104, 1945).*

Spray nozzles with needle valve control were found troublesome due to clogging so that another design was used for tests. Water from a supply pipe was passed through a distributing plate through a tangential channel and down through a circular orifice. It was found that as the pressure was raised the size of droplets and the spray cone angle were altered only slightly, but that a larger area was covered more uniformly. When the orifice diameter exceeded a certain value hollow spray cones were obtained. The smaller the channels in the distributing plate at the inlet the smaller the drop and the larger the spray cone angle. A formula involving flow rate, pressure, orifice diameter and channel size was derived.

—J.D. Parent

10. DEVELOPMENT ENGINEERING

PIPES

Frankland, T.W. THE PIPEFITTER'S AND PIPE WELDER'S HANDBOOK. *Bruce Publishing Company, Milwaukee, 1944 (Book).*

The handbook contains basic information in the form of tables, sketches and calculations to enable the pipe fitter and welder to solve some of the daily problems encountered. For the engineer who is learning to fit pipe there is much to be gained from this book. The size of the book is adapted to fit into the average work clothes pocket.

--N.W. Muller

SAFETY

Goldsberry, J.F. METHODS EMPLOYED TO PREVENT AND CONTROL FIRES AT SHELL'S WOOD RIVER REFINERY. *Oil and Gas J. 44, 83-85, 1945 (June 9).*

II. CHEMICAL ENGINEERING

CONTINUOUS PROCESSING. *Chem. Met. Eng. 52, 101-132, 1945 (May).*

Never before has there been so much interest in the possibilities for "continuizing" chemical engineering processes that are now operated on batch basis. Perhaps the most important conclusion of this study is that continuous processing is in no sense an overall panacea. Putting a process on a continuous basis nis not necessarily the path to greatest efficiency-in fact, it may be quite the reverse. Some processes are clear cut for batch, some for continuous processing or some for combination of the two. With others, however, the best choice may be a difficult one to make. Our problem then is to look at some of the determining factors, economic and technical; to see how processes have already "gone continuous"; to examine continuous process types, their peculiarities, their design problems. To gage the trend, we have assembled a group of articles in individual industries in which the prospects for continuous processing are assayed.

--Publisher's abstract.

The articles are:

McMullin, R.B. and Weber, M., Jr. Continuous Flow Processes-An Introduction.
Shreve, R.N. Historical View of Continuous Process Development.
Crawford, R.M. Economic Comparison of Batch and Continuous Processing.
Editorial Staff. How Continuity Affects Unit Operations and Processes.
Bissel, E.S. Problems in Dissolving Reaction and Mixing.
Considine, D.M. Control of Material Feed Rate.
Yeager, J.R. Pipeline Digester for Nitrocellulose.
Larian, M.G. How Batch Unit Processes are Made Continuous.
Bullock, H.L. Pitfalls in Working Out Continuous Processes.
Olsen, J.F. and Lyons, E.J. Technical Aspects of Continuous Processes.
Brothman, A., Wollan, G.N., and Feldman, S.M. Continuous Mixing and Reaction Equipment.
Wilkie, H.F. Distillery Processes.

COMPRESSORS

Ridgway, R.S. THE EFFECT OF SUPERCOMPRESSIBILITY OF NATURAL GAS UPON COMPRESSOR PERFORMANCE. *Calif. Oil World 38, 16-28, 1945 (March); Natl. Petroleum News 37, R-544-555, 1945 (July 4).*

Ideally, the specific volume of a gas can be computed as follows: $V = rT/P$ where r is the gas constant per unit of mass, T is the absolute temperature and P is the absolute pressure. Actually this equation is generally true only for moderate temperatures and low pressures. One may write $V=ZrT/P$ where Z is a correction factor called the "compressibility factor". Z may be correlated for a number of gases in terms of reduced temperatures and pressures, where a "reduced" quantity is the value of a variable divided by its value at the critical point. Sometimes it is necessary to divide by a slightly different quantity known as the pseudo-critical value in order to get the desired correlation. With this as a starting point, the author shows the effect of including Z in calculations relating to compressor performance, specifically the volumetric efficiency, capacity and brake horse-power.

--J.D. Parent

II. CHEMICAL ENGINEERING

FRACTIONATION

Booth, N. CHEMICALS FROM CARBONISATION GASES. PART I. THE SEPARATION OF METHANE AND ETHYLENE. *Coke* 7, 85-87, *1945 (May)*.

First of a series of articles on fractionation of components of coke oven gas. Part I is a general discussion of separation of methane and ethylene.

Coulson, E.A. LOSS EFFECTS AND EQUILIBRATION TIMES FOR PACKED FRACTIONATING COLUMNS OF HIGH EFFICIENCY. *J. Soc. Chem. Ind.* 64, *101-104, 1945 (April)*.

A simplified mathematical treatment of batch distillation data makes possible the calculation of the approximate time required to reach equilibrium in an efficient column. Application of the method to a series of 50- and 100-plate columns shows that doubling the column length quadruples the time necessary to attain a steady state. Sufficient time must be allowed for this purpose for multi-component and certain two-component mixtures. Incomplete condensation or leaks through ground joints affect efficiency determinations; determination and allowances for such losses are necessary for accurate work.

—C.H. Riesz

GASES

Mitchell, L.I. CHART FOR GAS VELOCITIES WITH A PITOT TUBE. *Chem. Met. Eng.* 52, *114-115, 1945 (June)*

A nomographic chart has been drawn which enables one to solve rapidly an equation for flow rate.

—J.D. Parent

PILOT PLANTS

PILOT PLANT PHASES. *Ind. Eng. Chem.* 37, *412-455, 1945 (May)*

These are papers presented at the recent (ninth) symposium on unit processes presented before the Division of Industrial and Engineering Chemists at the 108th meeting of the American Chemical Society. Papers by Barnebey and Vilbrandt relate to the need of the pilot plant stage in chemical process development, how this stage of development should be conducted and what data should be obtained. Papers by Rushton and by Bissel et al describe mixing and agitation in pilot plants. Several chemical processes, primarily vapor phase oxidation, in small scale equipment are reported by Hass and others. An interesting paper, "Pilot Plant Development of Fluid Catalytic Cracking" by Carlsmith and Johnson is presented as part of the symposium on catalysis at the same meeting. The original development work in up-flow systems is sketched. The authors mention that it was necessary to study many problems such as pressure drop, material flow, heat transfer data, cyclone efficiency, erosion and attrition, etc., but the results of such investigations are not mentioned.

Snreve, R.H. Pilot Plant Phases. Introduction
Barnebey, H.L. Chemical Process Pilot Plants
Vilbrandt, F.C. Use and Function of Pilot Plants in Chemical Industries
Rushton,J.H. Mixer Performance Data from Pilot Plants
Bissell, E.S.,Miller, F.D., and Everett,H.J. Agitation in Pilot Plants

II. CHEMICAL ENGINEERING

Kobe, K.A. and Dickey, W. Oxidation of Ferrous Sulfate Solutions with Oxygen

McBee, E.T., Hass, H.B., and Wiseman, P.A. Catalytic Vapor-phase Oxidation of Ethylene

Faith, W.L. Oxidation of Chlorinated Hydrocarbons to Maleic and Fumaric Acids

Hass, H.B., McBee, E.T., and Churchill, J.W. Oxidation of Hexadecane

Carter, R.P. Rosin Ester Development

--J.D. Parent

PIPELINES

Pearson, G. ASSESSMENT OF SMALL LEAKAGES FROM PIPELINES. *Gas Times* 43, 32-33, 1945 (April 14).

Directions are given for making a shut-in pressure-drop test with air and, by means of a table and simple formula, for calculating the rate of gas leakage equivalent to the time required for the air pressure to drop from 5 in. w.g. to 4 in. w.g. It is pointed out that a leakage rate of one thirtieth cu. ft./hr. from a 5 ft. length will require half a second in the case of 1/8" in. pipe but 6 min. 30 sec. in the case of 6 in. pipe, in both cases with gas whose specific gravity is 0.5. This rate of leakage will result in a carbon monoxide concentration of 0.01 per cent in a room having a volume of 200 cu. ft., if the gas contains 15 per cent carbon monoxide the average air-change rate is one in two hours, and a factor of safety of two is used. A comparison of the simple method with the use of a wet-test meter showed that the accuracy of the simple method was within 33-1/3 per cent.

--B. Miller

STATISTICAL METHODS

Evans, U.R. STATISTICAL METHODS IN DECIDING THE EFFICACY OF A MODIFICATION IN TECHNICAL PROCEDURE, THE USE OF THE T-TEST TO CHEMISTS AND ENGINEERS. *Chemistry & Industry* 23, 106-109, 1945 (April 7).

Starting with a discussion of conventional methods of statistical analysis the author develops several useful methods of evaluating data. From calculations of the probability of the deviations observed in different sets of data, one may decide whether the variations are random or systematic. Several ingenious graphical procedures are described.

--S. Katz

VALVES - FLOW COEFFICIENTS

Kroll, A.E. and Fairbanks, H.V. GLOBE-VALVE FLOW COEFFICIENTS FOR VALVE METERS. *Ind. Eng. Chem.* 37, 588-591, 1945 (June)

In conjunction with upstream and downstream pressure taps connected to a manometer, globe valves may be of service for metering as well as controlling fluids. The authors used bevel-seat brass disk valves and found a maximum deviation in flow coefficients of 5 for 1/2, 3/4 and 1 in. valves and 3 for a 1-1/4 in. valve, when Reynolds numbers referred to the pipe ranged from 30,000 to 150,000. Since such a value is normally used in the line for controlling flow rates, no added resistance to flow results when metering is to be effected.

--J.D. Parent

12. APPARATUS AND EQUIPMENT

CONDENSER - STEAM

Bowman, R.A. AN AIR COOLED STEAM CONDENSER. *Westinghouse Engineer 1945 (May).*

The author, Manager of the Condenser Engineering Division of the Westinghouse Company, has presented test data on air cooled steam condensers for use in portable power plants. His information is valuable, however, in considering the possibilities of air cooled steam condensation for other applications such as gas production. He points out that for fast velocities of about 1000 feet per minute, the heat transfer rate, in Btu per hour per degree F. per square foot of total surface, is approximately 12. Precautions necessary to eliminate freezing in very cold weather are given in detail. The author concludes that air cooled condensers are useful only in "those extreme conditions where water is not available and the increased cost and reduced operating efficiency can be justified."

--J.I. Yellott

DUST REMOVAL

VACUUM SYSTEM REMOVES DUST FROM OPEN-HEARTH FLUES. *Steel* 116, 125, *1945 (June 4).*

A vacuum system for dust removal from open-hearth flues to a receiving tank is described. It consists of a receiver and steam exhauster, steel pipe, 60 feet of hose, and a receiving nozzle. The collected material in the tank may be discharged into a box or a gondola car. The unit may be removed from one furnace to another or may be of permanent installation which can be used for six to eight furnaces. Saving in man-hours was found to be 50 per cent of former practice.

—M. Miyaji

FURNACES

Fitzsimmons, W.A. TEST DATA ON A MULTITUBULAR TYPE GAS-FIRED INFRA-RED OVEN. *Gas World, Industrial Gas Suppl.* 18, *39-42, 1945 (April 21).*

This paper describes and gives details of the performance of an infra-red oven used for experimental work on the drying of metal finishes and shows the results so far obtained. The radiating source consists of sixteen wrought iron tubes 6 ft. by 1-1/2 in. bore, fixed about a circle 30 in. in diameter to form a horizontal tunnel 6 ft. long. This tunnel has a 2 in. slot at the top for the conveyer equipment to pass the articles through the unit. A semi-bunsen jet is mounted on one end of each tube to introduce a combustible mixture of air and gas. Performance data are: gas rate, 330 cu.ft./hr.; suction applied at exhaust, 0.14 in. w.g.; CO_2 in waste gas, 6 per cent; waste gas temperature, 650°F.; heat in waste gases, 34 per cent.

--H.T. Inatomi

Hateley, R.N. MAINTENANCE OF VERTICAL RETORTS. *Gas J.* 245, *500-502, 1945 (April 18).*

Analysis of repairs to a battery of 30 carbonizing retorts handling 6.35 tons per day since 1936 is given. Ten units are let down each summer for cold repair: providing repairs once in three years for each retort. Repairs are described in terms of top firebrick, spalling zone, lower silica

and bottom firebrick. Face repairs are required each three years; average life of top firebrick is 6 to 7 years, of spalling zone is 5 years; lower silica must be carefully checked for leaks; bottom firebrick has not required placement since 1936.

—W. Volk

FURNACES

Thring, M.W. INDUSTRIAL FURNACES IN 1943–44. *Brit. Coal Utilization Research Assoc., Monthly Bull. 9, 144–150, 1945 (May).*

Review of progress of study of industrial furnaces by C.W.R.A. and general evaluation of the role of combustion, thermodynamics and heat transfer, aerodynamics of hot gases, and furnace operation and design is given. The conclusions contain recommendations for further fundamental research on luminous radiation and the aerodynamics of hot-gas systems. A bibliography of 54 references is included.

—L.A. Mekler

FURNACES - INSULATION

Ferguson, J.M. HEAT LOSSES AND THE INSULATION OF OPEN-HEARTH FURNACES AND BLAST FURNACES. *Inst. Fuel, War Time Bull. 18, 143–150, 1945 (April)*

The overall thermal efficiency of the open-hearth furnace varies from 13 to 22 per cent; it can be improved by insulating (1) the producer gas mains, (2) furnace flues, and (3) the regenerator's foundation and chamber walls, arches and dam walls. Calculations show that an annual saving of 1,645 tons of coke can be made on the blast furnace by insulating the hot blast mains and bustle pipes.

—M. Miyaji

Gard, J.S.F. THERMAL INSULATION AS APPLIED TO POTTERY FURNACES, KILNS AND CARBONISING PLANT. *J. Inst. Fuel 18, 151-156, 1945 (April)*

Insulation in the full height of a lime kiln is desirable; a greater thickness should be employed in the burning zone. A backing insulation is utilized between the lining and the shell. In rotary kilns, lining must be fixed to withstand movement. Bricks or blocks of 2-1/2 in. thickness next to the shell proved satisfactory. A guide is made in kiln design in the construction of floors, walls, and arches for working temperatures of 900, 1350, and 1420°C. A muffle furnace with a thin inner lining of dense refractory backed by insulating bricks appears to be of suitable construction. Discussion is made on the insulation of a horizontal coal carbonizing plant. For best results, a patchwork arrangement of insulation proved good. In a vertical retort economies in fuel consumption and improvement in comfort can be made by the introduction of insulating bricks in the oven roof, under and around the regenerator chamber of floors, and under the base and side walls of the flues. Lining of coke oven doors with insulating concrete proved encouraging. Insulation of waste flue gas main is desirable where heat is employed for boilers. From a profit-making point of view, insulation is a good investment.

—M. Miyaji

12. APPARATUS AND EQUIPMENT

GAS-DIESEL ENGINES

Rowley, L.N. NEW DEVELOPMENTS SPOTLIGHT THE GAS-DIESEL. *Power* 89, 290-296, *1945 (May)*.

Dual-fuel engines compress gas-air mixtures to high level for diesel efficiency; controls permit fuel shift while unit is running under load, or operation on a combination of gas and oil. Here is the history, explanation of working cycle and design details of commercial units.

--Author's Abstract

GAS METERS

Meyer, G. TESTING GAS METER DIAPHRAGMS FOR FLEXIBILITY. *Gas Times* 43, 38-40, *1945 (April 14)*. Translated from *Gas- und Wasserfach* 86, 332-335, *1943*.

The author describes a clever mechanical arrangement for testing gas meter diaphragms or diaphragm material for flexibility. By means of data taken with this apparatus and the use of a formula given by the author, one is able to forecast for a given meter at a stated load, the pressure drop across the meter attributable to the diaphragm material alone.

--M.F. Knoy

VALVES

La Violette, W.A. VALVE CONTROL FOR PRESSURE REGULATION. *Gas Age* 95, 41-43, *1945 (May 3)*.

Since conventional poppet-valve type pressure regulators cause an appreciable pressure drop even when wide open and since they must often be heavil built, a re-design has been effected. For his own service the author successfully converted the plug type flow control valve in his main line into a pressure control device. (The plug type of valve offers a minimum of resistance to flow when wide open.) Insofar as electricity was not available at the point where the valve was located, the positioning of the valve was accomplished by means of a motor cleverly constructed from an air drill and suitable gears. An interlocking arrangement served to prevent stalling of the mechanism.

--J.D. Parent

A POSITIVE SHUT-OPEN GAS VALVE; OPERATED BY SMALL CHANGES IN WATER PRESSURE DIRECTLY APPLIED. *Gas World* 122, 359-360, *1945 (April 14)*.

A simple design shut-open gas valve is described. The valve disc carried on a diaphragm is only stable in either the closed or wide open position and therefore, never operates throttled. The valve, as described, is actuated by slowly changing water pressure on one side of the diaphragm but presumably could be actuated by any pressure medium, liquid or gaseous

—M.F.Knoy

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